



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460
OFFICE OF CHEMICAL SAFETY AND POLLUTION PREVENTION
OFFICE OF PESTICIDE PROGRAMS REGISTRATION DIVISION (7505P)

FEE

DP BARCODE No.: D454085; **FILE SYMBOL/REG. No.:** 62719-631; **PRODUCT NAME:** Sulfoxaflor
Technical: **DECISION No.:** 554151; **PC Code(s):** 005210; **ACTION CODE:** R351; **FOOD Use:** Yes

DOCUMENT CONTAINS CONFIDENTIAL BUSINESS INFORMATION

DATE: April 24, 2020

SUBJECT: Product Chemistry Review of "Sulfoxaflor Technical" with an Unregistered Source

FROM: Dehui Duan, Chemist *DDuan* *sbmathur* 4-27-2020
Product Chemistry Team 4-24-2020
Chemistry, Inerts & Toxicology Assessment Branch (CITAB)/RD (7505P)

TO: Marianne Lewis / Venus Eagle, RM 01
IVB3 / RD (7505P)

REGISTRANT: DOW AGROSCIENCES LLC

MRID Number(s): 50891701

INTRODUCTION:

The registrant has submitted an application to amend the registration of Sulfoxaflor Technical to add a new unregistered source and replace the EPA accepted CSF dated 10/18/2016. In support of this application, the registrant has submitted a basic CSF dated 8/9/2019 and Group A chemistry data with MRID No. 50891701.

The existing Basic CSF dated 10/18/2016 – Nominal concentration: 97.9 % – Manufacture site: Dow AgroSciences LLC, Indianapolis, IN 46268

The proposed Basic CSF dated 8/9/2019 – Nominal concentration: 97.8 % – Manufacture site: Deccan Fine Chemicals (India) Pvt Ltd, Andhra Pradesh-531 127, India.

CITAB has been asked to determine the acceptability of the product chemistry data and the proposed basic CSF.

SUMMARY OF FINDINGS:

1. Group A guidelines:

830.1550: (product identity & composition)

The active ingredient was adequately described (MRID 50891701). The average concentration derived from the five-batch preliminary analysis results (97.8 %, from Page 33 of 135 in the Confidential Attachment of MRID 50891701) is within the range of certified limits (100-95%) on both the existing and proposed basic CSFs. The nominal concentration (97.9%) on the proposed CSF dated 8/9/2019 is the same as that on the previously acceptable CSF dated 10/18/2016. The information presented meets the data requirements for 40 CFR 158.320.

DP BARCODE No.: D454085; **FILE SYMBOL/REG. No.:** 62719-631; **PRODUCT NAME:** Sulfoxaflor Technical; **DECISION No.:** 554151; **PC Code(s):** 005210; **ACTION CODE:** R351; **FOOD Use:** Yes

830.1600: (description of materials used to produce the product)

Safety Data Sheets (SDSs) of all the starting materials, and their specifications and suppliers were provided in the study (MRID 47832286). The information presented meets the data requirements for 40 CFR 158.325.

830.1620 (description of production process)

A detailed description of the production process, vessels and equipment, in process control measures and a flow chart were included in MRID 47832286. The information presented meets the data requirements for 40 CFR 158.330.

830.1670 (discussion on the formation of impurities)

Potential impurities were identified and quantified as part of the five-batch analysis (MRID 50891701). The formation and identities of the impurities were fully discussed in MRID 47832286. Two impurities were found to be present in significant quantity (> 0.1% w/w). Other potential impurities including residual solvent were discussed and their concentrations are below 0.1%. No impurity of toxicological concern was identified. The information presented meets the data requirements for 40 CFR 158.335.

830.1700 (preliminary analysis)

Results are presented for a five-batch analysis using HPLC-UV with internal standard calibration for the active ingredient and associated impurities. All reference standards were certified. Identity of active ingredient was confirmed against the reference standard and by LC-MS and FT-IR. Impurities relevant to A.I. were identified by comparing with the impurity standards through LC/MS. Residual solvent was determined by GC-FID. Water content was analyzed by Karl Fischer method. Unknown impurities were quantitated using the response factor of a close-eluting known impurity (MRID 50891701). The information presented meets the data requirements for 40 CFR 158.345.

830.1750 (certified limits)

The proposed upper and lower certified limits for the active ingredient and impurities on the proposed CSF (dated 8/9/2019) are the same as those on the approved CSF. Some updates were justified. The information presented meets the data requirements for 40 CFR 158.350.

830.1800 (enforcement analytical method)

The analytical method for quantifying the active ingredient in Sulfoxaflor Technical was HPLC-UV, which was validated for linearity, specificity and precision. The methods for quantifying associated impurities and residual solvents were validated in terms of linearity, accuracy, specificity, precision, LOQ and LOD (MRID 47832286).

All methods are capable of determining whether an ingredient falls within its certified limits. The information presented meets the data requirements for 40 CFR 158.355.

2. Group B guidelines (physical-chemical properties):

Not required for adding a new source.

DP BARCODE No.: D454085; **FILE SYMBOL/REG. No.:** 62719-631; **PRODUCT NAME:** Sulfoxaflor
Technical; **DECISION No.:** 554151; **PC Code(s):** 005210; **ACTION CODE:** R351; **FOOD Use:** Yes

CONCLUSIONS:

The CITAB has reviewed the proposed alternate CSF (dated 8/9/2019) and the supporting Group A data for Sulfoxaflor Technical and has concluded that:

1. The product chemistry Group A data submitted for guidelines 830.1550 (product identity and composition), 830.1600 (description of materials used to produce the product), 830.1620 (description of production process), 830.1670 (discussion of the formation of impurities), 830.1700 (preliminary analysis), 830.1750 (certified limits), and 830.1800 (enforcement analytical method) are acceptable.
2. Impurities associated to the active ingredient are unlikely toxicological significance, as they have been identified on the previously approved CSF dated 10/18/2016. All new impurities of residual solvents were present below the LOQ.
3. The proposed basic CSF (dated 8/9/2019) is acceptable.
4. A one-page sheet listing MRID #, manufacturer's address and 5-batch analysis results was attached immediately behind the acceptable CSF.

DP BARCODE No.: D454085; FILE SYMBOL/REG. No.: 62719-631; PRODUCT NAME: Sulfoxaflor
Technical; DECISION No.: 554151; PC Code(s): 005210; ACTION CODE: R351; FOOD Use: Yes

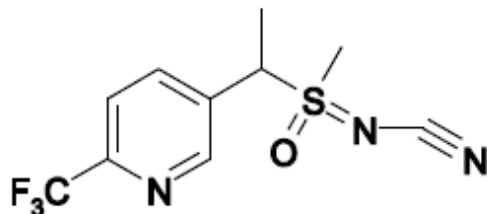
Active Ingredient

Product Name: Sulfoxaflor

EPA Registration Number: 62719-631

Sulfoxaflor

Chemical Structure:



Chemical Name: cyanamide, N-[methyloxy[1-[6-(trifluoromethyl)-3-pyridinyl]ethyl]-λ4-sulfanylidene]-

CAS #: 946578-00-3

Molecular Formula: C₁₀H₁₀F₃N₃OS

Molecular Weight: 277.3

Impurities and/or inert ingredients

Total

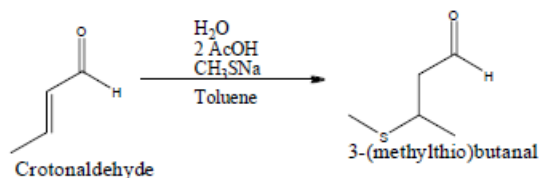
w/w%
97.9

2.1
100.0

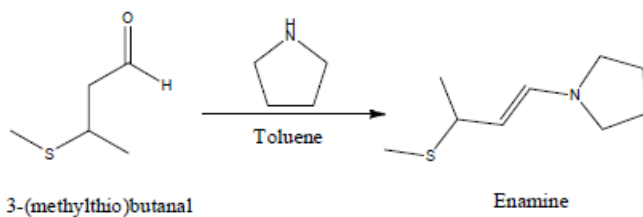
Confidential Appendix

1. Synthetic pathway (MRID No. 47832286)

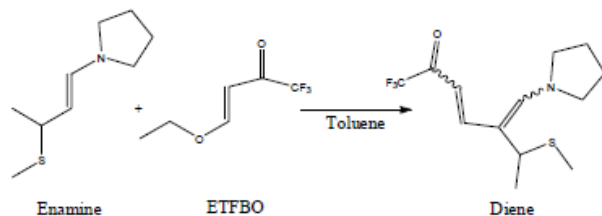
Step 1



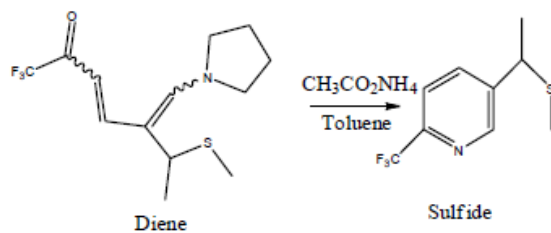
Step 2



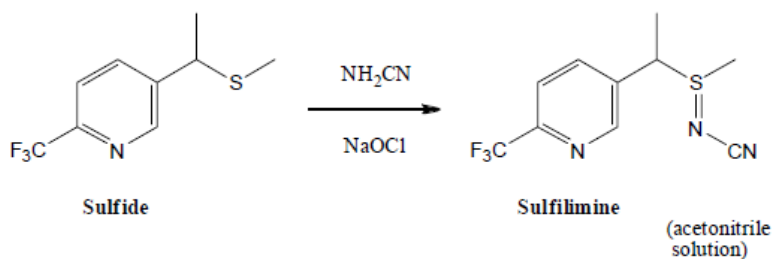
Step 3



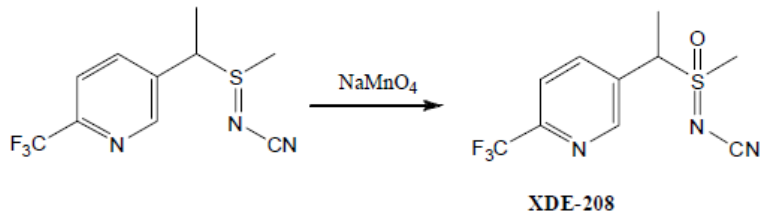
Step 4



Step 5



Step 6



DP BARCODE No.: D454085; **FILE SYMBOL/REG. No.:** 62719-631; **PRODUCT NAME:** Sulfoxaflo
Technical: **DECISION No.:** 554151; **PC Code(s):** 005210; **ACTION CODE:** R351; **FOOD Use:** Yes

2. Discussion of the formation of impurities (MRID No.47832286)

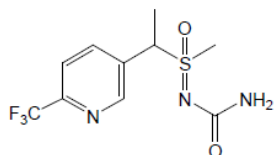
N-(methyl(oxido){1-[6-(trifluoromethyl)pyridin-3-yl]ethyl}-λ4-sulfanylidene) urea

Common Name: X11719474

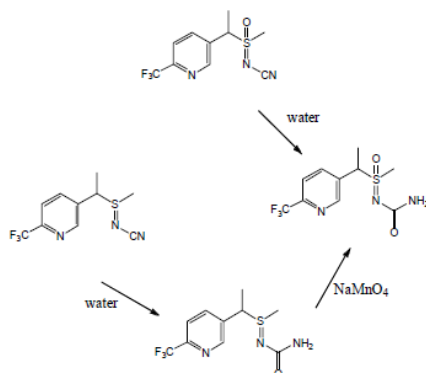
MW = 295.3 C₁₀H₁₂F₃N₃O₂S

CAS# none

Structure:



Formation: The N-(methyl(oxido){1-[6-(trifluoromethyl)pyridin-3-yl]ethyl}-λ4-sulfanylidene) urea is formed by the hydrolysis of the cyano group of the XDE-208 product. It is also plausible that it can be formed by hydrolysis of the cyano group of the sulfilimine intermediate prior to oxidation of the sulfilimine group up to the sulfoximine group.



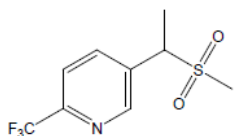
5-[1-(methylsulfonyl)ethyl]-2-(trifluoromethyl)pyridine

Common Name: X11519540

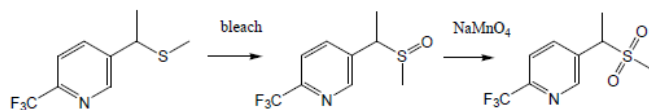
MW = 253.2 C₉H₁₀F₃NO₂S

CAS# none

Structure:



Formation: The 5-[1-(methylsulfonyl)ethyl]-2-(trifluoromethyl)pyridine is formed by the permanganate oxidation of the sulfoxide impurity, which is a major by-product in the bleach oxidation reaction (step 5.). It is also plausible that the sulfone can form from the break down of XDE-208 or some other impurity.



DP BARCODE No.: D454085; **FILE SYMBOL/REG. No.:** 62719-631; **PRODUCT NAME:** Sulfoxaflo
Technical: **DECISION No.:** 554151; **PC Code(s):** 005210; **ACTION CODE:** R351; **FOOD Use:** Yes

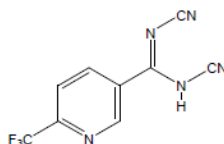
4 N,N'-dicyano-6-(trifluoromethyl)nicotinimidamide

Common Name: X12082275

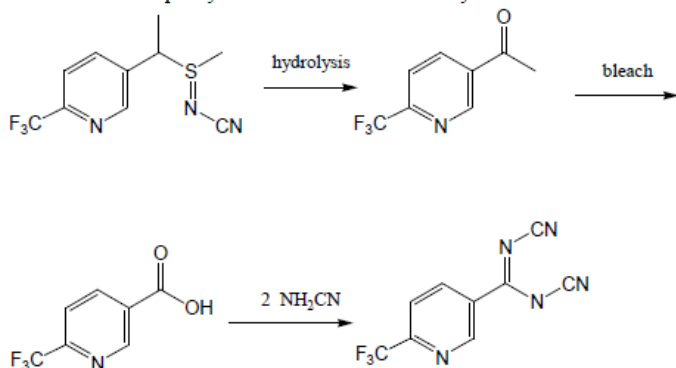
MW = 239.2 C₉H₄F₃N₅

CAS# none

Structure:



Formation: A possible pathway for the formation of N,N'-dicyano-6-(trifluoromethyl)nicotinimidamide is through a pyridine carboxylic acid impurity and subsequent addition of two moles of cyanamide. The carboxylic acid impurity could result from the methyl ketone.



Acetonitrile

MW = 41.05 C₂H₃N

CAS# [75-05-8]

Source: Acetonitrile is a solvent used in the process.

Isopropanol

MW = 60.1 C₃H₈O

CAS# [67-63-0]

Source: Isopropanol is a solvent used in the process.

Water

MW = 18.0 H₂O

CAS# [7732-18-5]

Source: Water is a solvent used in the process.

DP BARCODE No.: D454085; FILE SYMBOL/REG. No.: 62719-631; PRODUCT NAME: Sulfoxaflo
 Technical; DECISION No.: 554151; PC Code(s): 005210; ACTION CODE: R351; FOOD Use: Yes

3. Preliminary Analysis (MRID No. 50891701)

Component	Standard	Weight Percent (%)					Mean	St. Dev.
		TSN318511	TSN319295	TSN319296	TSN319299	TSN319300		
Sulfoxaflo	TSN105878	98.3	98.0	97.1	98.0	97.5	97.8	0.48
X11719747	TSN030626-0003	0.09	0.06	0.03	0.03	0.03	0.05	0.03
X11519540	TSN030652-0002	1.23	0.90	0.90	0.86	0.89	0.96	0.15
X12082275	TSN300741	ND	0.02	0.03	0.01	ND	0.02	0.01
X12243073	TSN308923	0.03	0.02	0.02	0.01	0.01	0.02	0.01
Isopropanol	lot 175837	<LOQ (0.036)	<LOQ (0.036)	<LOQ (0.036)	<LOQ (0.036)	<LOQ (0.036)	N/A	N/A
Acetonitrile	lot 186763	<LOQ (0.035)	<LOQ (0.035)	<LOQ (0.035)	<LOQ (0.035)	<LOQ (0.035)	N/A	N/A
Water	N/A	0.08	0.14	0.14	0.15	0.16	0.13	0.03
Unknown @ RT 0.77 min		0.08	0.09	0.06	0.04	0.04	0.06	0.02
Mass Balance %		99.8	99.2	98.3	99.1	98.6		

ND = Not Detected

<LOQ = Below the Limit of Quantitation *

*LOQs are experimentally derived from the method validation DAS-AM-G-10-9

DP BARCODE No.: D454085; **FILE SYMBOL/REG. No.:** 62719-631; **PRODUCT NAME:** Sulfoxaflor
Technical: **DECISION No.:** 554151; **PC Code(s):** 005210; **ACTION CODE:** R351; **FOOD Use:** Yes

4. Analysis Conditions (MRID No. 50891701)

a. Active Ingredient

Analysis of Active Ingredient and Related Impurities (DAS-AM-G-10-16 and DAS-AM-G-12-23)

Instrument: Agilent 1260 HPLC
Column: Zorbax SB-phenyl, 4.6 x 75 mm, 3.5 μ m
Column Temperature: Ambient
Flow: 1.5 mL/min
Detector: UV at 260 nm
Inj. vol. 10 μ L
Eluent A: Water with 0.1% formic acid
Eluent B: 90/10 Water/Methanol + 0.1% formic acid
Eluent C: 90/10 Acetonitrile/methanol + 0.1% formic acid
Gradient:

Time (min)	%A	%B	%C
0	100	0	0
2	100	0	0
3	0	100	0
14	0	83	17
20	0	83	17
35	0	22	78

The column was equilibrated with the initial mobile phase conditions for 7 minutes prior to each injection.

Run Time: 35 minutes
Integrator: Agilent OpenLab

Approximate Retention Times:


Benzamide (ISTD):	~ 4.3 minutes	
X11719474:	~ 9.0 minutes	
X11519540:	~ 10.6 minutes	
Diastereomer A:	~ 12.2 minutes	} Sulfoxaflor*
Diastereomer B:	~ 12.8 minutes	
X12082275:	~ 13.5 minutes	
X12243073:	~ 15.6 minutes	

*Sulfoxaflor is composed of two diastereomers. The peaks were integrated as a group in the data processing system.

b. Impurities (Residual Solvents)

Chromatograph: Agilent 7890 GC
Column: Stabilwax DA 15 m x 0.53 mm x 1.0 μ m
Oven: 45°C hold for 5.0 minutes;
30°C/minute to 245°C, hold for 4 minutes
Injection volume: 1.0 μ L
Injection port: Split at 275°C with a split flow of 100 mL/min
Pressure: Constant pressure mode of helium at 9.5 psi
Detector: FID at 300°C
Run Time: 15.667 minutes
Integrator: Agilent OpenLab
Approximate Retention Times:
Isopropanol: ~ 0.5 minutes
Acetonitrile: ~ 0.7 minutes
Chlorobenzene (ISTD): ~ 2.8 minutes


Confidential Business Information: Does Not Contain National Security Information (E.O. 12065)

United States Environmental Protection Agency Office of Pesticide Programs (TS-767) Washington, DC 20460		A. <input checked="" type="checkbox"/> Basic <input type="checkbox"/> Alternate		B. Page 1 of 5	
EPA Confidential Statement of Formula					
1. Name and Address of Applicant/Registrant (Include ZIP Code) Dow AgroSciences LLC 9330 Zionsville Rd. Indianapolis, IN 46268		2. Name and Address of Producer (Include ZIP Code) The Dow Chemical Company Midland, MI 48674 MRID: 47832286, 50891701 EPA Establishment Number: 464-MI-1 (See Attachment Page 4 of 5)			
3. Product Name Sulfoxaflor Technical Solid		4. Registration No./File Symbol 62719-631		5. EPA Product Mgr./Team No. Venus Eagle / 1	
		7. Pounds/Gal or Bulk Density 0.25 - 0.35 g/mL (bulk density)		8. pH 5.0 - 6.5 (1% slurry)	
				9. Flash Point/Flame Extension Not Applicable	
EPA USE ONLY	10. Components in Formulation (List as actually introduced into the formulation. Give commonly accepted chemical name, trade name, and CAS number.)	11. Supplier Name and Address	12. EPA Reg No.	13. Each Component in Formulation a. Amount (lbs.) b. % by Weight	14. Certified Limits % by Weight a. Upper b. Lower
005210	Sulfoxaflor (diastereomeric mixture) cyanamide, N-[methyloxy[1-[6-(trifluoromethyl)-3-pyridinyl]ethyl]-λ4-sulfanylidene]- CAS # 946578-00-3	Dow AgroSciences LLC 9330 Zionsville Road Indianapolis, IN 46268		979 (nominal)	97.9 (97.9) Note 1
	X11719474 N-(methyl(oxido){1-[6-(trifluoromethyl)pyridin-3-yl]ethyl}-λ4-sulfanylidene) urea CAS # N/A			1.0	0.1
	X11519540 5-[1-(methylsulfonyl)ethyl]-2-(trifluoromethyl)pyridine CAS # N/A			13.0	1.3
	X12082275 N,N'-dicyano-6-(trifluoromethyl)nicotinimidamide CAS # N/A			1.0	0.1
	Impurity A2 CAS # N/A	Acceptable DDuan 4-24-2020		1.0	0.1
	Impurity B2 5-[1-[(chloromethyl)sulfonyl]ethyl]-2-(trifluoromethyl)pyridine (or isomer) CAS # N/A			1.0	0.1
16. Typed Name of Approving Official Joy Megregian			17. Total Weight, lbs.		
18. Signature of Approving Official 			19. Title Associate Chemist		20. Phone No. (Include Area Code) 317-337-4284
					21. Date 9-Aug-19


This is a reproduction of EPA Form 8570-4 (Rev. 12-90)

Electronic Date Stamp: 08/14/2019

Confidential Business Information: Does Not Contain National Security Information (E.O. 12065)

United States Environmental Protection Agency Office of Pesticide Programs (TS-767) Washington, DC 20460		A. <input checked="" type="checkbox"/> Basic <input type="checkbox"/> Alternate		B. Page 2 of 5	
EPA Confidential Statement of Formula					
1. Name and Address of Applicant/Registrant (Include ZIP Code) Dow AgroSciences LLC 9330 Zionsville Rd. Indianapolis, IN 46268		2. Name and Address of Producer (Include ZIP Code) The Dow Chemical Company Midland, MI 48674 EPA Establishment Number: 464-MI-1 (See Attachment Page 4 of 5)			
3. Product Name Sulfoxaflor Technical		4. Registration No./File Symbol 62719-631		5. EPA Product Mgr./Team No. Venus Eagle / 1	
		7. Pounds/Gal or Bulk Density 0.25 - 0.35 g/mL (bulk density)		8. pH 5.0 - 6.5 (1% slurry)	
		9. Flash Point/Flame Extension Not Applicable			
10. Components in Formulation (List as actually introduced into the formulation. Give commonly accepted chemical name, trade name, and CAS number.)		11. Supplier Name and Address		12. EPA Reg No.	
EPA USE ONLY				13. Each Component in Formulation a. Amount (lbs.) b. % by Weight	
Isomers of IDMW564 4-[[[(E)-methyl{1-[6-(trifluoromethyl)pyridin-3-yl]ethyl}-λ4-sulfanylidene)amino]-6-[[[(Z)-methyl{1-[6-(trifluoromethyl)pyridin-3-yl]ethyl}-λ4-sulfanylidene]amino]-1,3,5-triazin-2-amine (or isomer)]] CAS # N/A				2.0 0.2	
Isomers of IDMW581 4-[[[methyl(oxido){1-[6-(trifluoromethyl)pyridin-3-yl]ethyl}-λ6-sulfanylidene]amino]-6-[[[(Z)-methyl{1-[6-(trifluoromethyl)pyridin-3-yl]ethyl}-λ4-sulfanylidene]amino]-1,3,5-triazin-2-amine (or isomer)]] CAS # N/A				1.0 0.1	
Water CAS # 7732-18-5				1.0 0.1	
16. Typed Name of Approving Official Joy Megregian				17. Total Weight, lbs. 1000 100	
18. Signature of Approving Official 		19. Title Associate Chemist		20. Phone No. (Include Area Code) 317-337-4284	
				21. Date 9-Aug-19	

Confidential Business Information: Does Not Contain National Security Information (E.O. 12065)

United States Environmental Protection Agency Office of Pesticide Programs (TS-767) Washington, DC 20460		A.	B.	
		<input checked="" type="checkbox"/> Basic		
EPA Confidential Statement of Formula		<input type="checkbox"/> Alternate	Page 3 of 5	
1. Name and Address of Applicant/Registrant (Include ZIP Code) Dow AgroSciences LLC 9330 Zionsville Rd. Indianapolis, IN 46268		2. Name and Address of Producer (Include ZIP Code) The Dow Chemical Company Midland, MI 48674 EPA Establishment Number: 464-MI-1 (See Attachment Page 4 of 5)		
3. Product Name Sulfoxaflor Technical	4. Registration No./File Symbol 62719-631	5. EPA Product Mgr./Team No. Venus Eagle / 1	6. Country Where Formulated U.S.A. (See Attachment Page 5 of 5)	
	7. Pounds/Gal or Bulk Density 0.25 - 0.35 g/mL (bulk density)	8. pH 5.0 - 6.5 (1% slurry)	9. Flash Point/Flame Extension Not Applicable	
This Confidential Statement of Formula (CSF) replaces the current U.S. Environmental Protection Agency's approved CSF dated October 19, 2016.				
Updates:				
1. Added an Alternate Producer to Box 2.				
2. Added an Alternate Country Where Formulated in Box 6.				
3. Adjusted Upper Limit for Sulfoxaflor from 100.0 to 99.9 (per EPA guidelines) in Box 14.				
4. Add Alternate Producers Page/Alternate Producer (Page 4 of 5) and Alternate Counties Page/Alternate Country (Page 5 of 5).				
Note 1: Nominal (label claim) is 97.9% on a dry-weight basis. Sulfoxaflor is produced as a wet cake with 0 - 32% water. The water content is variable and dependent upon process conditions and end-use specifications.				
16. Typed Name of Approving Official Joy Megregian				
18. Signature of Approving Official 		19. Title Associate Chemist		20. Phone No. (Include Area Code) 317-337-4284
				21. Date 9-Aug-19

CONFIDENTIAL BUSINESS INFORMATION - Dow AgroSciences LLC
ATTACHMENT [A]
CONFIDENTIAL STATEMENT OF FORMULA [EPA Form 8570-4]


Page 4 of 5

IDENTIFICATION INFORMATION FOR THE PRODUCERS
OF TECHNICAL GRADE ACTIVE INGREDIENT (TGAI)

Sulfoxaflo Technical
EPA REGISTRATION NUMBER: 62719-631

Basic

Name and Address of Additional Producer(s)	EPA Establishment Number	Date on CSF on Which the Manufacturing Site First Appears(ed)	Date of EPA Letter Approving the CSF (and, Therefore, the Manufacturing Site)	MRID number(s) of supporting data (e.g. Representative Batch Analysis)	Date of EPA Review Accepting the Supporting Data
Deccan Fine Chemicals (India) Pvt Ltd Kesavaram, Venkatanagaram Post, Payakaraopeta Mandal, Visakhapatnam Dist., Andhra Pradesh-531 127, India (Note 1)	085143-IND-001	9-Aug-19	Pending	Pending	Pending

Typed Name of Approving Official Joy Megregian			
Signature of Approving Official 	Title Associate Chemist	Phone No. (Include Area Code) (317) 337-4284	Date 9-Aug-19

Electronic Date Stamp: 08/14/2019

CONFIDENTIAL BUSINESS INFORMATION - Dow AgroSciences LLC
ATTACHMENT - ALTERNATE LIST
CONFIDENTIAL STATEMENT OF FORMULA [EPA Form 8570-4]

Page 5 of 5

IDENTIFICATION INFORMATION FOR ALTERNATE COUNTRIES

Sulfoxaflor Technical
EPA REGISTRATION NUMBER: 62719-631

Basic

CSF Box 6
Alternate Countries

Alternate Countries Where Formulated
India

Typed Name of Approving Official

Joy Megregian

Signature of Approving Official

Joy N. Megregian

Title

Associate Chemist

Phone No. (Include Area Code)

(317) 337-4284

Date

9-Aug-19

Electronic Date Stamp: 08/14/2019

MRID: 50891701

A new Source/producer

Deccan Fine Chemicals (India) Private Limited
Kesavaram, Venkatanagaram Post,
Payakaraopeta Mandal,
Visakhapatnam District, Andhra Pradesh, 531 127, India

Component	Standard	Weight Percent (%)					Mean	St. Dev.
		TSN318511	TSN319295	TSN319296	TSN319299	TSN319300		
Sulfoxaflo	TSN105878	98.3	98.0	97.1	98.0	97.5	97.8	0.48
X11719747	TSN030626-0003	0.09	0.06	0.03	0.03	0.03	0.05	0.03
X11519540	TSN030652-0002	1.23	0.90	0.90	0.86	0.89	0.96	0.15
X12082275	TSN300741	ND	0.02	0.03	0.01	ND	0.02	0.01
X12243073	TSN308923	0.03	0.02	0.02	0.01	0.01	0.02	0.01
Isopropanol	lot 175837	<LOQ (0.036)	<LOQ (0.036)	<LOQ (0.036)	<LOQ (0.036)	<LOQ (0.036)	N/A	N/A
Acetonitrile	lot 186763	<LOQ (0.035)	<LOQ (0.035)	<LOQ (0.035)	<LOQ (0.035)	<LOQ (0.035)	N/A	N/A
Water	N/A	0.08	0.14	0.14	0.15	0.16	0.13	0.03
Unknown @ RT 0.77 min		0.08	0.09	0.06	0.04	0.04	0.06	0.02
Mass Balance %		99.8	99.2	98.3	99.1	98.6		

ND = Not Detected

<LOQ = Below the Limit of Quantitation *

*LOQs are experimentally derived from the method validation DAS-AM-G-10-9

Common Name (X#)	Chemical Name
Sulfoxaflo	[1-(6-(trifluoromethyl)pyridin-3-yl)ethyl] (methyl)oxido- λ^4 -sulfanylidene cyanamide
X11719474	N-[methyl(oxido){1-[6-(trifluoromethyl)pyridin-3-yl]ethyl}- λ^4 -sulfanylidene]urea
X11519540	5-[1(methanesulfonyl)ethyl]-2-(trifluoromethyl)pyridine
X12243073	5-{1[(chloromethyl)sulfonyl]ethyl}-2-(trifluoromethyl)pyridine
X12082275	N,N'-dicyano-6-(trifluoromethyl)pyridine-3-carboximidamide
IPA	2-propanol
ACN	acetonitrile

Prepared by Dehui Duan @ 4/24/2020